

Intraoperative Occult Hypoxemia is an Independent Risk Factor for 30-day and 1-year Mortality

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Background: Despite the widespread use of pulse oximetry for intraoperative estimation of arterial oxygen saturation, there is growing evidence that certain patient populations may be vulnerable to inaccurate pulse oximetry measurements. Our author group previously investigated the incidence of occult hypoxemia for patients undergoing anesthesia and found that Black and Hispanic race/ethnicity was significantly associated with higher odds of occult hypoxemia relative to White patients [1]. However, the clinical implications of these events have not been established. There is emerging evidence in the critical care literature that unrecognized hypoxemia is associated with end-organ damage and adverse outcomes, such as in-hospital mortality [2,3]. In this investigation, we sought to better elucidate the relationship between intraoperative occult hypoxemia and postoperative mortality among patients undergoing anesthesia.

Methods: Data was collected from our departmental data warehouse for all adult patients (≥ 18 years) undergoing anesthesia between 2008 to 2019 with at least one intraoperative arterial blood gas recorded. The number of occult hypoxic events, defined as arterial oxygen saturation (SaO_2) of less than 88% despite oxygen saturation measured by pulse oximetry (SpO_2) greater than 92%, were determined. Demographic (including self-reported race/ethnicity), intraoperative, and comorbidity data were recorded. Mortality data for our cohort was extracted from the United States Social Security Death Index and used to determine thirty-day and one-year postoperative mortality. Multiple logistic regression modelling was utilized to analyze whether at least one occult hypoxic event was predictive of 30-day and 1-year mortality.

Results: There were 38,475 patients and 128,666 paired readings included in the final analysis. There were 921 patients (2.4%) with at least 1 occult hypoxic reading. Of these, 849 patients (92.2%) had one occult hypoxic reading and 72 (7.8%) had two or more occult hypoxic readings. The overall 30-day mortality rate was 2.9% and one-year mortality rate was 8.3%. In our multiple logistic regression model, patients that experienced at least one occult hypoxic event had significantly higher odds of both 30-day mortality (Odds ratio [OR] 1.65, 95% confidence interval [CI] 1.14 to 2.36, $p=0.007$) and one-year mortality (OR 1.60, CI 1.25 to 2.08, $p<0.001$). Interaction terms between race and occult hypoxemia were tested and found to not be significant for predicting 30-day ($p=0.345$) and one year mortality ($p=0.653$) and thus were not included in the final model. This model was repeated after stratifying the cohort into patients with zero, one, and two or more occult hypoxic events. Two or more occult hypoxic events had a higher odds ratio for predicting 30-day mortality (OR 3.16, CI 1.28 to 7.77, $p=0.012$) than only one occult hypoxic event (OR 1.49, CI 1.00 to 2.23, $p=0.048$). A similar relationship was observed for predicting one-year mortality for one event (OR 1.54, CI 1.16 to 2.01, $p=0.002$) and two or more events (OR 2.44, CI 1.63 to 5.10, $p=0.018$).

Conclusions: Overall, we found that intraoperative occult hypoxic events were associated with significantly higher odds of 30-day and 1-year mortality. Moreover, the mortality risk appears to rise with two or more occult hypoxic events.

References:

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